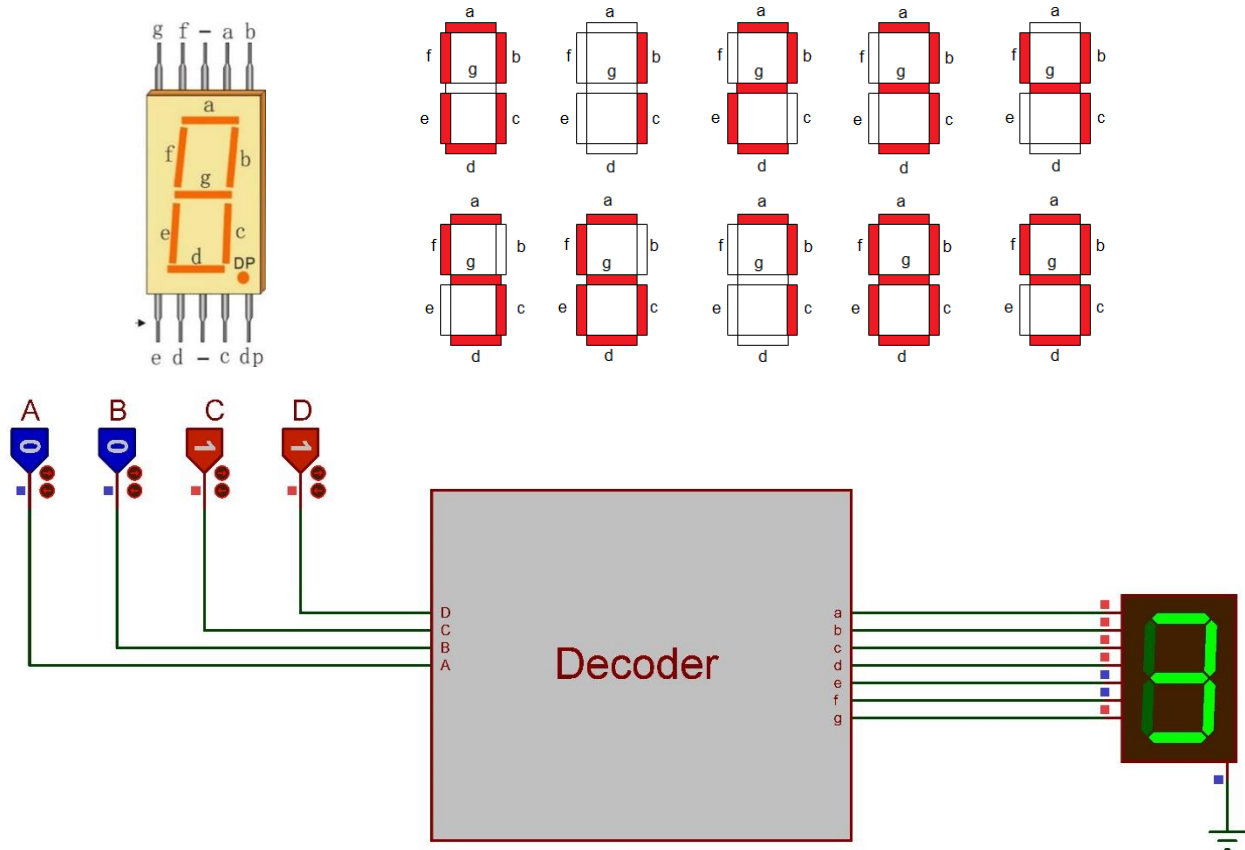**Name, Last name: Emre Topcu**
Student No: 20220808011

LAB03 Assignment

Your task is to design a decoder circuit that runs a 7-segment display. The circuit must show the numbers from 0 to 9 that is controlled with 4-bit input (ABCD). The steps you should do as follows.

1. Fill the truth table in page 2 based on the led statuses given in the picture above.

2. **Fill the Karnough Maps** on the page 3 to obtain the simplest Boolean function for each LED (from **a** to **g**) of the 7-segment display. We did first 3 LED (a,b,c) in the Lab class. Fill the karnough maps in page 3 and write the functions you obtained to the last raw of each K-Map table. For each rectangle use different colors on the rectangles to make the table easy to understand (Example tables is given in the first K-Map which is for Fa, Fb, Fc). (To add rectangle you can copy and paste existing ones)

PS: Upload the completed version of this file as a single .pdf file.

3. Finally, design the Boolean functions on Proteus Design Suite. (Use JUMPERS as we did in the lab!). Upload the project file. 7 Segment display must show all the digits (0-9) correctly corresponding to BCD input. A base design file is given in the assignment.

PS: Don't forget to fill your name and student number.

Truth Table

Digit	Inputs				Outputs (Seven Segment Led Pins)						
	A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0
2	0	0	1	0	1	1	0	1	1	0	1
3	0	0	1	1	1	1	1	1	0	0	1
4	0	1	0	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	0	1	1	1	1	1
7	0	1	1	1	1	1	1	0	0	0	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	1	0	1	1

CD AB	00	01	11	10
00	1	0	1	1
01	0	1	1	1
11	X	X	X	X
10	1	1	X	X

$$F_a = B'D' + BD + C + A$$

CD AB	00	01	11	10
00	1	1	1	1
01	1	0	1	0
11	X	X	X	X
10	1	1	X	X

$$F_b = C'D' + CD + B'$$

CD AB	00	01	11	10
00	1	1	1	0
01	1	1	1	1
11	X	X	X	X
10	1	1	X	X

$$F_c = C' + D + B$$

CD AB	00	01	11	10
00	1	0	1	1
01	0	1	0	1
11	X	X	X	X
10	1	1	X	X

$$F_d = A + B'D' + B'C + CD' + BC'D$$

CD AB	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	X	X	X	X
10	1	0	X	X

$$F_e = B'D' + CD'$$

CD AB	00	01	11	10
00	1	0	0	0
01	1	1	0	1
11	X	X	X	X
10	1	1	X	X

$$F_f = C'D' + A + BC' + BD'$$

CD AB	00	01	11	10
00	0	0	1	1
01	1	1	0	1
11	X	X	X	X
10	1	1	X	X

$$F_g = A + BC' + CD' + CB'$$